PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

CRAWFORD A.
A.A. THORNTON & CO.
235 High Holborn
London WC1V 7LE
GRANDE BRETAGNE

30 mth = 19/10/2001

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT
(PCT Rule 71.1)

Date of mailing *(day/month/year)*	04.09.2001
Applicant's or agent's file reference ABC/NJW19553	**IMPORTANT NOTIFICATION**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB00/01508	18/04/2000	19/04/1999

Applicant
PTB(IP) LIMITED

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/	Authorized officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Atienza Vivancos, B Tel.+49 89 2399-7891

Form PCT/IPEA/416 (July 1992)

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
ABC/NJW19553		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB00/01508	18/04/2000	19/04/1999
International Patent Classification (IPC) or national classification and IPC H02H3/33		
Applicant PTB(IP) LIMITED		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 1 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
10/11/2000	04.09.2001
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer van der Haegen, D Telephone No. +49 89 2399 2683

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/01508

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-14	as originally filed				

Claims, No.:

8-16	as originally filed				
1-7	as received on	25/05/2001	with letter of	24/05/2001	

Drawings, sheets:

1/3-3/3	as originally filed				

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	3-4, 6, 8-16
	No:	Claims	1-2, 5, 7
Inventive step (IS)	Yes:	Claims	6, 8-16
	No:	Claims	1-5, 7
Industrial applicability (IA)	Yes:	Claims	1-16
	No:	Claims	

2. Citations and explanations
   see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

R It m V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following document :

   D1: DE-A-3 723 568 (SIEMENS AG) 26 January 1989.

2. **Article 33(2) PCT**

2.1 Document D1, which is considered to represent the most relevant state of the art, discloses (see figure 1; column 1 ,line 50 - column 2, line 13) a drive circuit for a residual current device comprising :

- a differential current transformer (2) having a first primary coil (3), a second primary coil (4) and a secondary coil (7) and

wherein

- the secondary coil is series connected to a square wave generator (5) and a capacitive measuring resistance (9) that is arranged to provide an output drive voltage to an evaluation unit (10), comprising a rectifier (101), in response to any current imbalance between the respective currents flowing in the first and second primary coils,
- the differential current transformer is arranged to be close to the saturation point during normal operation (see eg. column 1, lines 61-64), and to cross the saturation point when a differential current is detected (see eg. column 1, line 65 - column 2, line 7) such that the amplitude of the output drive voltage across the capacitive measuring resistance is caused to be higher (see eg. column 2, lines 7-8).

Document D1 further discloses :

- a trip unit that trips when the output drive voltage exceeds a threshold (102) and

- a latching mechanism comprising a tertiary winding (71) on the transformer, a reference voltage circuit (15), a comparing unit (20) and a latch (K). Said mechanism latches the evaluation unit in case of transient voltages (see eg. column 3, line 55 - column 4, line 45).

2.2 Hence, the drive circuit according to independent claim 1 does not differ from the drive circuit according to D1. The subject-matter of independent claim 1 is therefore not new.

2.3 The features introduced by the subject-matter of claims 2, 5 and 7 are known from D1 and do not, therefore, add matter to claim 1 that renders it novel :

- for claim 2, see D1, eg. column 3, lines 50-54, "Gleichrichter",
- for claim 5, see D1, eg. column 2, lines 14-25 and
- for claim 7, see D1, eg. figure 1, reference signs 11, 14.

2.4 The features introduced by the subject-matter of claims 3-4, 6 and 8-16 are not known from D1 and add matter to claim 1 that renders it novel.

3. **Article 33(3) PCT**

3.1 The features introduced by the subject-matter of claims 3 and 4 are a matter of normal design and/or fall within the scope of the customary practice followed by a skilled person. They do not add matter to independent claim 1 that involves an inventive step.

3.2 The features introduced by the subject-matter of claims 6 and 8-16 add matter to claim 1 that involves an inventive step.

4. **Article 33(4) PCT**

Claims 1-16 are industrial applicable.

R It m VII

Certain defects in the international application

1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

2. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

3. In accordance with Rule 5.1(a)(i) PCT the description specifies the technical field of the present application. However, in view of independent claim 1, the invention appears to relate to a drive circuit for an active material low power electrical switching mechanism rather than to electrical switching mechanisms as such.

4. According to the requirements of Rule 10.2 PCT, the terminology used shall be consistent throughout the application. This requirement is not met in view of the use of e.g the following expressions :

   - a slider element (cf. description) vs. a planar slide member (cf. claims) or a slide(r) member (cf. also claims),
   - a spacer (cf. description) vs. a planar spacer member (cf. claims),
   - ... .

Re Item VIII

Certain observations on the international application

1. The relative terms "(...)**higher** voltage with **lower** power **than otherwise**" (emphasis added) used in claim 1 have no well-recognised meaning and leave the reader in doubt as to the meaning of the technical features to which they refer, thereby rendering the definition of the subject-matter of said claim unclear (Article 6 PCT).

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 04 December 2000 (04.12.00)	
International application No. PCT/GB00/01508	**Applicant's or agent's file reference** ABC/NJW19553
International filing date (day/month/year) 18 April 2000 (18.04.00)	**Priority date** (day/month/year) 19 April 1999 (19.04.99)
Applicant POWELL, Simon	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

10 November 2000 (10.11.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Zakaria EL KHODARY

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION** see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
ABC/NJW19553		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/GB 00/ 01508	18/04/2000	19/04/1999
Applicant		
PTB(IP) LIMITED		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of Invention is lacking** (see Box II).

4. With regard to the **title,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 1

   [X] as suggested by the applicant.

   [ ] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

   [ ] None of the figures.

FOR THE PURPOSES OF INFORMATION ONLY

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CLAIMS:

1. A drive circuit for a residual current device, the circuit comprising a transformer having a first primary coil and a second primary coil, and a secondary coil arranged to provide an output drive voltage in response to any current imbalance between the respective electric currents flowing in the first and second primary coils; the transformer being further arranged to saturate at a level of current imbalance less than a level indicative of a fault condition.

2. A drive current according to claim 1, and further comprising voltage rectifying means arranged to rectify the output drive voltage.

3. A drive circuit according to claim 1 or 2, and further comprising voltage multiplying means arranged to multiply the output drive voltage to an operational level.

4. A drive circuit according to any of the preceding claims, wherein said transformer is arranged to saturate at 50% of the current imbalance level indicative of a fault condition.

5. A drive circuit according to any of the preceding claims, wherein said first primary coil and said second primary coil are each provided with n_1 turns, and said secondary coil is provided with n_2 turns, wherein $n_2 > n_1$.

6. A drive circuit according to any of the preceding claims, wherein said output drive voltage is used to actuate an active material bender.

7. An electrical switching mechanism comprising a drive circuit according to any of the preceding claims arranged to drive an electrical actuator